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(71)Applicant : SEIKO EPSON CORP

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(72)Inventor : MOCHIZUKI SEIJI

NAKAMURA MASAHIRO

KAWAKAMI KAZUHISA

OSHIMA KEIICHI

YOSHIDA MASANORI

(30)Priority

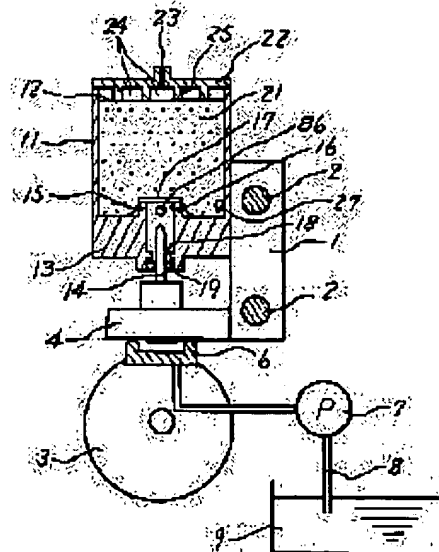
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(54) INK CARTRIDGE FOR INK JET RECORDING DEVICE

(57)Abstract:

PURPOSE: To prevent gas from getting into an ink feed passage by providing a packing member resiliently contacting the outer periphery of an ink feed needle on the forward end of an ink takeout port and sealing the opening at the forward end by means of a seal member, into which the ink feed needle can be inserted.

CONSTITUTION: An ink feed needle 14 is detachably mounted to a container 11 and an ink takeout port 15 is projected from the bottom of the container 11 and a filter 17 is provided on the port 15 and an ink absorption porous body 21 is provided in the container. When an ink cartridge 5 is inserted into the needle 14, the forward end thereof passes through a seal member, so that the forward end passes through a packing member 19 above the seal member and comes into communication with the ink absorbed in the body 21. As a



result, the outer periphery of the needle 14 is sealed by the member 19 so that the needle comes into communication with the ink in a liquid-tight manner. And a constant printing pressure is maintained between a record head 4 and the needle by the surface tension of the body 21 so that the ink is supplied to the head 4.

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(71)出願人 000002369

セイコーエプソン株式会社

東京都新宿区西新宿2丁目4番1号

(72)発明者 望月 聖二

長野県諏訪市大和3丁目3番5号 セイコーエプソン株式会社内

(72)発明者 中村 正弘

長野県諏訪市大和3丁目3番5号 セイコーエプソン株式会社内

(72)発明者 川上 和久

長野県諏訪市大和3丁目3番5号 セイコーエプソン株式会社内

(74)代理人 弁理士 木村 勝彦 (外1名)

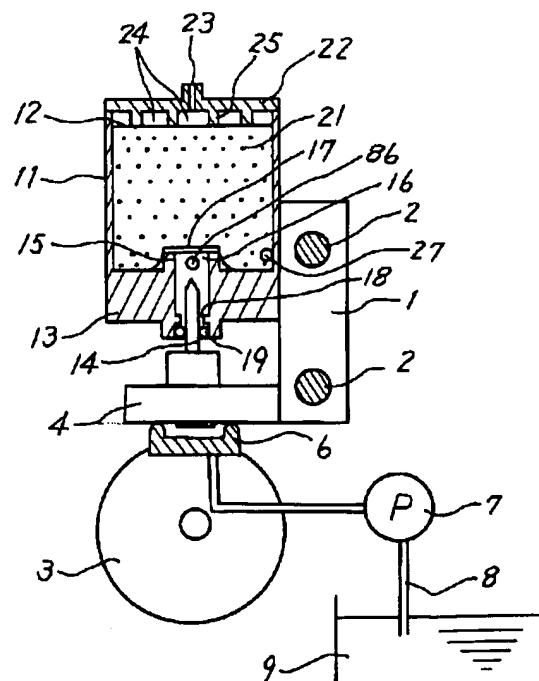
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(54)【発明の名称】 インクジェット記録装置用インクカートリッジ

(57)【要約】

【目的】 インクカートリッジとインクジェット記録装置本体のインク供給路とを確実に接続すること。

【構成】 インクジェット式記録装置のインク供給針14に着脱可能な容器11に、その底面13の表裏から突出するインク取出し口15にフィルタ17を介装してインク吸収用多孔質体21を収容し、インク取出し口15の先端にインク供給針14の外周に弾接するパッキング部材19を設け、先端開口をインク供給針14が貫通可能なシール材20で封止する。カートリッジ11をインク供給針14に挿入すると、インク供給針14の先端がシール材20を貫通してパッキング材19を通過する。これにより、インク供給針14が周囲をパッキング材19で封止されて液密状態でカートリッジのインクに連通する。



【特許請求の範囲】

【請求項1】 インクジェット記録装置本体のインク供給針に着脱可能な容器に、その底面の表裏から突出するインク取出し口と、該取出し口の容器側にフィルタを介装して弾接されたインク吸収用多孔質体を備え、前記インク取出し口の先端にインク供給針の外周に弾接するパッキング部材を設け、先端開口を前記インク供給針が貫通可能なシール材で封止してなるインクジェット記録装置用インクカートリッジ。

【請求項2】 前記パッキング部材が弾性リングにより構成されている請求項1のインクジェット記録装置用インクカートリッジ。

【請求項3】 インクジェット記録装置本体のインク供給針に着脱可能な容器に、その底面の表裏から突出するインク取出し口と、該取出し口の容器側にフィルタを介装して弾接されたインク吸収用多孔質体を備え、前記インク取出し口の先端領域にインク供給針の外周に弾接するパッキング部材と、前記インク供給針が貫通可能で前記開口を封止するシール材と、前記パッキング部材とシール材との間に前記シール材の破片を排除する手段を設けてなるインクジェット記録装置用インクカートリッジ。

【請求項4】 前記パッキング部材、及びシール材排除手段が共に弾性リングにより構成されている請求項3のインクジェット記録装置用インクカートリッジ。

【請求項5】 インク供給針の通孔が位置する領域に多孔質弾性部材を收容し、前記多孔質弾性部材と前記フィルタの間にインク溜部が確保されている請求項1、3のインクジェット記録装置用インクカートリッジ。

【請求項6】 インクジェット記録装置本体のインク供給針に着脱可能な容器に、その底面の表裏から突出するインク取出し口と、該取出し口の容器側にフィルタを介装して弾接されたインク吸収用多孔質体を備え、前記インク取出し口の先端にインク供給針の外周に弾接するパッキング部材を設け、先端開口を前記インク供給針が貫通可能なシール材で封止するとともに、少なくとも容積率15パーセント程度の空間を保持するように気密性容器に減圧状態で收容してなるインクジェット記録装置用インクカートリッジ。

【請求項7】 前記空間は、容器上部の空間により確保されている請求項6のインクジェット記録装置用インクカートリッジ。

【請求項8】 前記空間は、前記気密性容器に同包した緩衝材により確保されている請求項6のインクジェット記録装置用インクカートリッジ。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、記録媒体上に直接インクを吐出し記録を行うインクジェット記録装置に適したインクカートリッジの構造に関する。

【0002】

【従来の技術】インクジェット記録装置の記録ヘッドへのインク供給は、カートリッジ形式に構成されたインクタンクにより行なわれている。このようにカートリッジ形成に構成されたインクタンクは、インク補給時にインクの漏洩などによる汚染を防止する上で非常に有用である反面、気泡が侵入し易いため、気泡の侵入を防止する方策についていろいろと提案されている。このような技術の内、特開平3-92356号公報に開示されたものは、インクタンク下部のインク取出し口をゴム栓で構成し、このゴム栓に金属性のインク供給針を貫通させて記録ヘッドへのインク流路と接続するようになっており、このためゴム栓の貫通が可能のようにインク供給針は、ステンレスなどの耐蝕性を備えたパイプの先端を極めて鋭利に形成するとともに、その側面に直径1mm程度のインク供給孔を設けて構成されている。このため、不用意な取扱いを行なうと怪我をするという問題を抱えている。

【0003】このような問題を解消するために、インク供給口の先端に予め通孔を有するパッキング材を設け、この通孔をシール材により封止して、あまり鋭利でないインク供給針の挿入を可能としたものも提案されている（特開昭50-74341号公報）。

【0004】しかしながらインクタンクは、液体のままインクが收容されているため、インク供給針の挿入時におけるインクの漏洩や、また水頭差を生じる虞れを抱えている。

【0005】ところで、インクジェット記録装置のヘッドに安定して印字を行なわせるためにはインクタンクから記録ヘッドへのインクの供給圧を-30〜-100mmAq（水頭）程度の負圧に保つことが極めて有効であり、特にキャリッジ上に記録ヘッドとインクタンクを搭載したインクジェット記録装置にあっては、インクタンクの設置高さでインクの供給圧力を調整することが困難である。このような問題を解消するために、インクカートリッジ内に多孔質吸収材を收容してこれの毛细管現象によりインクタンクと記録ヘッドとの間に陰圧を生じさせることも提案されている（特開平2-187364号公報）。

【0006】

【発明が解決しようとする課題】しかしながら、これはインクタンク内のインクが無くなった時点でインクタンクと記録ヘッドを一体構成として交換する形式のもので、インクタンクだけを選択的に交換する際に生じる記録ヘッドへの空気の流入や、インクの漏洩などいろいろな問題までは何等考慮されていない。本発明はこのような事情に鑑みてなされたものであって、その目的とするところは、先端に鋭利な形状を必要とすることなく、インクタンクの交換時に記録装置本体のインク供給流路への気体の侵入を防止し、またインク供給針とインクタンク

クとの高い気密性を確保することができる、インクジェット記録装置に適したインクカートリッジを提供することである。

【0007】

【課題を解決するための手段】このような問題を解決するために本発明においては、インクジェット記録装置本体のインク供給針に着脱可能な容器に、その底面の表裏から突出するインク取出し口と、該取出し口の容器側にフィルタを介装して弾接されたインク吸収用多孔質体を備えたものにおいて、前記インク取出し口の先端にインク供給針の外周に弾接するパッキング部材を設け、先端開口を前記インク供給針が貫通可能なシール材で封止するようにした。

【0008】

【作用】カートリッジをインク供給針に挿入すると、インク供給針の先端がシール材を貫通し、これの上部のパッキング材を通過して、多孔質体に吸収されているインクと連通する。これにより、インク供給針は、周囲をパッキング材で封止されて液密状態でカートリッジのインクと連通し、多孔質体の表面張力により記録ヘッドとの間に一定の陰圧を維持してインクを記録ヘッドに供給することになる。

【0009】

【実施例】そこで以下に本発明の詳細を図示した実施例に基づいて説明する。図2は、本発明のインクカートリッジを使用されるインクジェット記録装置の一例を示すものであって、図中符号1は、プラテン3の軸方向に往復動可能にガイド2、2に配設されたキャリッジで、これには印字信号に一致してインク滴を噴射するインクジェット記録ヘッド4と、これにインクを供給するインクカートリッジ5が搭載されている。6は、印刷領域外に配置されたキャップ装置で、休止期間中に記録ヘッド4の前面に当接してノズル開口の乾燥を防止すると共に、インクカートリッジ5の交換時や、インク吐出能力が低下した場合に、ノズル開口を密封して吸引ポンプ7からの陰圧を作用させて強制的にインクを吐出させるもので、吸引されたインクはパイプ8により廃インクタンク9に収容保管される。なお、図中符号10は、記録ヘッド4に印字信号を伝送するケーブルを示す。

【0010】図1は、本発明のインクカートリッジの一実施例を、記録装置に装着した状態で示すものであって、図中符号11は、インクカートリッジの本体を構成する容器で、上部に開口12を備え、底面側に若干細りとなるようにテーパ形状に形成されており、底面13にはインク供給針14の周囲に弾性的に係合するインク取出し口15を一体的に設けて構成されている。インク取出し口15は、その両端が底面から突出したパイプ状に形成されており、インク容器11の内側に突出する開口16には高分子材料や耐蝕性金属により構成された升目のサイズ20乃至100ミクロンメートル程度のステ

ンレスメッシュを用いたフィルタ17が溶着固定されている。インク取出し口15の内面中央部には段差18を設けて、先端開口側にインク供給針14に弾接して液密状態を維持するパッキング材、この実施例ではゴム製リング、いわゆるOリング19が設けられている。開口15には高い気密性と、接触などによる外力では破損せず、かつインク供給針の貫通を容易ならしめるシール材、例えば高分子フィルムや、高分子フィルムに金属層をラミネートしたフィルム20が溶着されている。

【0011】21は、多孔質体で、断面が容器11の開口12よりも若干大きめで、かつ高さが容器の高さよりも若干大き目に形成されており、下端部がインク取出し口15のフィルタ17に弾接して、インク取出し口15の形状に応じて圧縮され、また周辺が容器11の側壁により圧迫された状態で容器11内に収容されている。22は、蓋で、大気連通路23と、多孔質体21を弾圧してカートリッジ内に或程度の空間24、24を確保するためのリブ25、25を備えている。

【0012】26、27は、カートリッジ5のインクがインク供給口12にのみ存在する状態、いわゆるインクニアエンドを検出する電極18で、一方は容器11の底部に、また他方はインク供給口15に位置するように設けられている。これら電極26、27には図4に示したように抵抗Rを介して交番電圧Vccを印加されており、電極間の電圧変化を微分回路30により検出し、その電圧変化率と設定値とを比較回路31により比較して、設定値よりも大きくなった時点、つまり多孔質体21のインクが少なくなって全体のインク残量が急激に少なくなりつつある時点で信号を出力する目的で使用されている。

【0013】一方、カートリッジと協同するインク供給針14は、その先端が円錐状に形成されていて、その先端面34にカートリッジのインクと供給路35とを接続する複数の通孔36、36、36、36が穿設されている。

【0014】このように構成したインク容器は、0.2乃至0.4気圧程度の減圧下で、インクを多孔質体21の各細孔に吸収させることがでインクが充填されることになる。このような減圧下でのインク封入は、特開昭60-245560号公報に示されたように印字品質を安定させる上で極めて有用な手法である。インクの充填が終了した段階で、カートリッジは、気密性の高い材料、例えばアルミニウム層を有するラミネートフィルムからなる袋にバックされて出荷に備えることになる。

【0015】図5は、前述のインクカートリッジの包装形態の一実施例を示すものであって、気密性が極めて高い2枚のアルミラミネートフィルム37によりカートリッジをサンドイッチ状態に包み込み、内部の空気を減圧し、その周縁部38を熱圧着したものである。ところで、包装時の圧力の大きさについてであるが、特公平3

ー61592号公報に示されたように20 Torr以下というような、インク充填時よりも極めて高い真空状態で封止する方法も考えられるが、通常インク充填作業と包装作業とが行なわれる場所に隔たりがあるので、カートリッジは一時的に大気圧に晒されてしまっている。このため、包装袋時に充填時よりも大きな陰圧を圧力を掛けると、インク充填作業から包装作業までの間にインクに溶け込んだ空気がインクから遊離して気泡が発生して、インクの洩れ出しなどが生じる恐れがあるばかりでなく、多孔質体中に生じた気泡がカートリッジから記録ヘッドへのインクの流出を妨げて印刷時にインク切れを引き起こすことになる。このような問題を回避するために、容器11へのインク充填時の圧力よりも若干大気圧よりの陰圧の下で包装しておくのが望ましいことを見出

した。

【0016】染料を用いたインクのように分解によりガスを発生するものにあつては、包装袋内に減圧空間が確保されていることで、ガスがインク内に溶け込むのを可及的に少なくして印字品質の劣化を防ぐことができる。また、充填用インクとして脱気されていないものを使用しても減圧空間により、保存中に脱気を促進させることが可能となるばかりでなく、包装袋から外部へのインク漏洩を防止することができる。

【0017】次に減圧包装時の減圧値と、減圧包装状態における保存期間後のインク脱気度を、空気の主成分である窒素量をパラメータにとって説明する。

【0018】

【表1】

減圧値 (気圧)	窒素量 (PPM)
0.5	7.5～9.0
0.35	7.0～8.5
0.2	6.0～7.5

【0019】実験によれば包装時の圧力を制御することにより、包装開封時におけるインクカートリッジ内のインクの脱気度を調整できる。表1は、包装時のチッソ濃度を13～14 ppm程度の飽和値と一定にしたときの包装圧力（陰圧のゲージ圧力）と開封時点でのインクカートリッジ内のインクに融込んでいるチッソの濃度を示すものである。次に、開封後にインクタンク内のインクの脱気度の変化の様子をインク中の窒素量をパラメータに採って説明する。図6は、開封直後からの窒素量の変化を示すものである。インクカートリッジは、その上部にリブにより形成確保された空間を有しているため、減圧値に応じて一定の空気が包装の初期から包装内に存在する。これがため、包装直後から短期間の内にインク中の窒素濃度が急激に増加し、その後一定値に落ち着き、包装袋により気密性が保持されるため、以後一定値が維持される。このような状態は、製造から大体年位維持することができる。そして開封された図中b点より順次窒素量は上昇する。インク中の窒素量は、開封後1週間程度で大気飽和に達する。この状態であっても1つのカートリッジを使用するに要する期間1乃至4週間程度は、印刷品質を実用レベルに維持できることを確認した。

【0020】ここでインクの脱気による効果について説明する。インクタンクを中空針に対して抜き差しする際に、中空針より混入する空気の量は、通常は非常に微量である。実験による確認では、中空針のインク流入口径が直径0.8mm程度の時、混入する空気の量は、多くてもメニスカス分の0.4立方mm程度以下であった。一度

混入した空気は記録ヘッドに向って流れ、フィルタ室内のフィルタ（不図示）に到達しトラップされる。このトラップされた空気はフィルタの目粗さが非常に微細なため容易にフィルタを通過することはない。実験によればフィルタ直径が4mm、フィルタ室内の空間幅が0.3～0.5mm程度の時にインクタンクの抜き差し回数が10～数10回行っても記録動作によって該空気がフィルタを通過することはなかった。この程度の空気の混入であれば、図6のCまでの期間中は、明らかに脱気インクを記録ヘッドに供給することができ、それによりインクタンクを中空針に対して抜き差しする際に、中空針より混入した空気はインクに溶け込み問題とはならない。しかしながら、不注意により中空針から取り外したインクタンクを外したまま放置された場合には、インク供給針から混入してしまう。いうまでもなくインクに溶解した空気は、サイフォン現象を破壊するので吐出不良を招くこととなる。このような場合に備えてインクジェット記録装置は記録ヘッドに陰圧を作用させて強制的にインクを吐出させるための吸引ポンプを備えている。このような場合にも不都合が発生したときのインクの脱気度によって回復度に大きな差があることが実験から判明した。図6で示す開封後2～4週間程度までのインクであれば、フィルタ室内の空気を吸引ポンプにより吸引除去するのに何ら不具合はない。ところがこの期間を過ぎるとインク中の空気量は完全飽和、さらには気温の変動により過飽和状態となった場合には、回復操作による陰圧の作用を受けてインク内に微小な気泡が発生し、これが吐出不良

を招くことになる。

【0021】図7は、インクカートリッジの包装方法の他の実施例を示すもので、カートリッジをスポンジ粒40、40、40……などの緩衝材で包んで前述の包装袋41に収容し、この状態で減圧処理を行なうものである。この実施例によれば、緩衝材40、40……により包装袋内に空間を確保することが可能となるから、多孔質体21に可及的に多くの、例えば多孔質体の見かけの体積の95パーセント位を充填しても、包装時の減圧状態を長期間にわたって維持することが可能となり、印字品質の向上と、インク充填効率の向上を図ることができる。

【0022】このように包装状態で供給されたカートリッジを使用する場合は、包装袋からカートリッジを取り出し、インク取出し口15の先端開口をインク供給針14に位置合わせしてカートリッジをインク供給針14に平行に押し込む。この過程においてインク供給針14は、シール材20を貫通してパッキング材19に到達する。これによりインク供給針14の先端部がパッキング材19を介してインク供給口15と液密状態となり、供給口15内のインクと連通することとなる。インク供給針14がシール材20を貫通する際、シール材20はその弾性により供給針14の先端形状にできるかぎり変形して空気の混入を防止する。

【0023】ところで、インク供給針14の先端に形成された通孔36、36、36……は、直径0.1乃至0.4mm以下に選択されているため、カートリッジの交換時にもメニスカを保持して、インク供給針14から記録ヘッドへの空気の侵入が抑えられる。また通孔36、36、36が複数個設けられているから、ここを通過するインクへの流体抵抗は可及的に小さくなっており、印刷に支障を来さない量のインクが記録ヘッド4に供給される。そして、インク取出し口15の先端は多孔質体21を弾性的に変形させた状態でこれに嵌入しているから、インク取出し口近傍領域における多孔質体の細孔は、その径が他の領域よりも小さくなっていて、インクに対する毛細管力が相対的に大きくなっている。このため、インクをこの部分に集中させることが可能となって、インク切れを招くことなく最後までインクを記録ヘッドに排出することが可能となる。

【0024】なお、上述の実施例においてはインク供給口15のシール材20を露出させるようにしているが、図8に示したようにシール材20を取り囲むように縁部45を形成しておく、不意な指Fの接触等による外力の作用を縁部45で受け止めてシール材20の破損を防止できるばかりでなく、この縁部を案内部材としてインク供給針14の挿入を容易に行なうことができる。

【0025】図9は本発明のインクカートリッジの他の実施例を示すものであって、図中符号50は、インクカートリッジの本体を構成する容器で、上部に開口51を

備えて底面側が若干先細りとなるようにテーパ形状に形成し、また底面52には後述する記録装置本体に設けられたインク供給針14と係合するインク取出し口53をパイプ状に形成して構成されている。インク取出し口53は、その両端が底面から突出したパイプ状に形成されており、インク容器50の内側に突出する開口54には高分子材料や耐蝕性金属により構成されたフィルタ55が溶着固定されている。インク取出し口53の内面中央部には段差56を設けて、先端開口側にインク供給針14に弾接して液密状態を維持するパッキング材、この実施例ではゴム製リング、いわゆるOリング57を設け、これの下側に後述するシール膜押え部材、この実施例ではOリング58を上下に挿入されている。開口部59は、高い気密性を備え、かつインク供給針の貫通を容易ならしめる膜、例えばラミネートフィルムからなるシール材60で封止されている。一方、開口51は、大気連通路61を有する蓋62により封止され、容器50の上部に空間63が確保されている。なお、図中符号64はインク吸収用多孔質体を、また65は、インクニアエンド検出用の電極を示す。

【0026】このようにして構成されたインクカートリッジは、前述の場合と同様に減圧下で脱気インクを充填されて、インク充填時よりも若干大気圧側寄りの陰圧を維持するように包装袋に封入されて保管される。記録装置のカートリッジを交換する場合は、包装袋からカートリッジを取り出し、インク取出し口53の先端開口をインク供給針14に位置合わせしてカートリッジをインク供給針14に平行に押し込む。この過程においてインク供給針14は、シール材60を貫通してシール阻止材58を通過し、パッキング材57に到達する。これによりインク供給針14の通孔36、36……がインク供給口15と連通し、インク供給針14の周囲がパッキング材57により液密状態を保持される。ところで、インク供給針14がシール材60を貫通する際に、シール材60の一部が供給針14とともに供給口内に侵入することもあるが、シール材60の破片60aは阻止材58により上部への移動を阻まれることになって(図10イ、ロ)、パッキング材57に到達することはない。この結果、阻止材58とインク供給針14との間に空間66が生じたとしても、これよりもインク側に位置するパッキング材57により液密性を確保されて、インクの漏洩が防止される。

【0027】図11は本発明の第3実施例を示すものであって、図中符号70は、前述したようなインク吸収用の多孔質体を収容する容器の底面で、ここには前述したのと同じようにパイプ状のインク供給口71が形成され、上端の開口にフィルタ72を介して前述のインク吸収用の多孔質体に弾接されている。インク供給口71の中央部にはパッキング材73とシール材阻止部材74とが挿入され、ブッシュ75により固定され、開口76を

シール材 77 で封止するようになっている。78 は、インク溜室 79 に設けられたインクニアエンド検出用の電極 80 とシール材 73 との間に設けられた多孔質体で、上部を段差 81 により係止されて、インク供給針の挿入によっても移動しないように位置決めされている。なお図中符号 95 は、インク検出用の他方の電極を示す。

【0028】図 12 は、上述したインクカートリッジに適したインク供給針 90 の一実施例を示すものであって、シール材 77、阻止材 74、及びパッキング材 73 への挿入を容易ならしめる円錐状もしくは斜面状の先端部 91 を備え、また本体部 92 には内部の供給口 93 に連通するようにほぼ水平方向の開口 94、94、94 が形成されている。

【0029】この実施例においてカートリッジのシール材 77 をインク供給針 90 に位置決めしてカートリッジを押し込むと、インク供給針 90 はシール材 77 を貫通し、シール材阻止部材 74 及びパッキング材 73 を通過する。インク供給針 90 は、その先端部 91 が封止されているので、カートリッジ挿入過程で生じるピストン効果により生じるインク溜め室 79 の体積変化は、先端部 91 と、パッキング材 73 で受け止められて通孔 93 に伝わるのを阻止され（図 13 イ）、インク供給口の多孔質体 78 を経由して上部に抜けることとなる。このようにしてカートリッジ挿入過程におけるインク供給口の圧力を容器側に逃しながらインク供給針 90 の開口 94、94、94 がパッキング材 73 を通過すると、開口 94、94、94 を介して通孔 93 にインクを流入させる（同図ロ）。

【0030】このようにインクカートリッジ挿入過程においては、インク供給針の通孔 93 とインク供給口 71 との連通を断つため、カートリッジ挿入時に起こり勝ちな記録ヘッドへのピストン効果による体積変化を阻止して、記録ヘッド 4 のノズル開口からのインクの染み出しを防止することができる。また、先端部に通孔を穿設する必要がないため、インク供給針に十分な強度を確保させることができるため、金属以外の材料、例えば高分子材料により供給針を構成することが可能となっており、製造プロセスの簡素化と、金属針特有の危険性を回避することができる。インク供給針の外径を大きくしても穿設する通孔 94、94、94 の内径を、メニスカを保持できる程度に選択することにより適当な流路抵抗を確保できるため、インク供給針を高分子材料で成形してもカートリッジ挿入に耐える強度を確保することが可能となる。

【0031】ところで、メンテナンスなどの都合で、インクが残存している状態にもかかわらずカートリッジをインク供給針から取り外した場合には、インク供給針先端近傍に存在しているインクは、カートリッジ内のインク吸収用多孔質体の毛細管力によってその近傍に位置する多孔質体 78 まで吸収される。そしてこの多孔質体 7

8 は、カートリッジ本体に収容されているインク吸収用多孔質体とほぼ同等の毛細管力を有しているから、インク溜室 79 にインクが残留することになる。このため、カートリッジの脱着による気泡の侵入を防止することができ、またたとえカートリッジを脱着してもインクニアエンド信号の出力を回避することができ、この結果インクニアエンド信号が出力されると復帰操作が面倒なインクジェット記録装置であっても、再装着するだけで印刷を再開することができる。

【0032】なお、第 3 実施例においては水平方向に通孔が穿設されたインク供給針を用いる場合について説明したが、カートリッジ挿入時におけるピストン効果が小さい場合には図 3 に示したような先端に通孔を有するインク供給針が使用可能であることは明らかである。また第 3 の実施例においては、パッキング材、及びシール材阻止部材の脱落を防止するべく止め材を用いているが、シール材の剛性が比較的大きい場合には省略することが可能である。

【0033】

【発明の効果】以上のように本発明においては、インクジェット記録装置本体のインク供給針に着脱可能な容器に、その底面の表裏から突出するインク取出し口と、取出し口の容器側にフィルタを介装して弾接されたインク吸収用多孔質体を備え、インク取出し口の先端にインク供給針の外周に弾接するパッキング部材を設け、取出し口の先端開口をインク供給針が貫通可能なシール材で封止したので、先端に鋭利な形状を必要とすることなく、インクタンクの交換時に記録装置本体のインク供給流路への気体の侵入を阻止でき、またインク供給針とインクタンクとの高い気密性を確保できる。

【図面の簡単な説明】

【図 1】本発明の一実施例を記録装置に装着した状態で示す断面図である。

【図 2】本発明のインクカートリッジが使用されるインクジェット記録装置の概要を示す構成図である。

【図 3】図 1 におけるインク供給針近傍を拡大して示す図である。

【図 4】インクニアエンド検出回路の一例を示すブロック図である。

【図 5】インクカートリッジの包装形態の一実施例を示す斜視図である。

【図 6】保存期間とインクへのチッソ溶解度との関係を示す線図である。

【図 7】インクカートリッジの包装形態の他の実施例を示す断面図である。

【図 8】インクカートリッジのシール板近傍の構造を示す断面図である。

【図 9】本発明のインクカートリッジの他の実施例を示す断面図である。

【図 10】同図（イ）（ロ）は、それぞれ図 9 に示した

インクカートリッジにおけるインク供給針挿入過程の動作を示す縦断面図、及び横断面図である。

【図11】本発明の他の実施例をインク供給口近傍の構造をもって示す断面図である。

【図12】図12に示したインクカートリッジに適したインク供給針の一実施例を示す図である。

【図13】図(イ)(ロ)は、それぞれ図12、図13に示したインクカートリッジとインク供給針との動作を示す説明図である。

【符号の説明】

1 キャリッジ

3 プラテン

4 インクジェット式記録ヘッド

5 インクカートリッジ

6 キャップ装置

11 容器

12 開口

13 底面

14 インク供給針

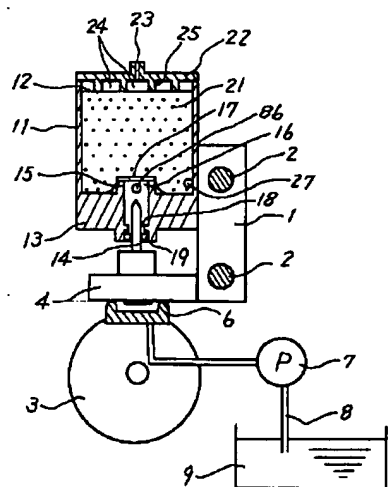
15 インク取出し口

19 パッキング材

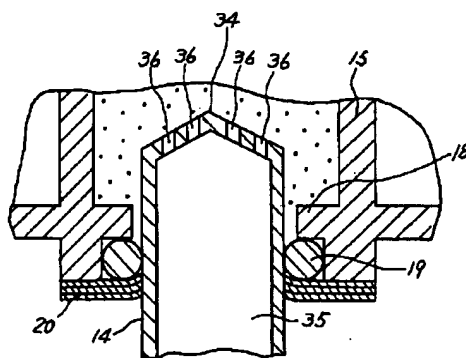
20 シール材

21 多孔質体

【図1】

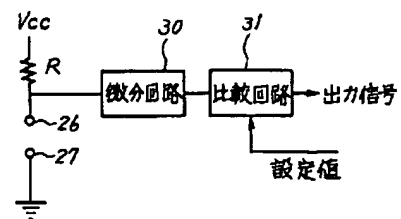
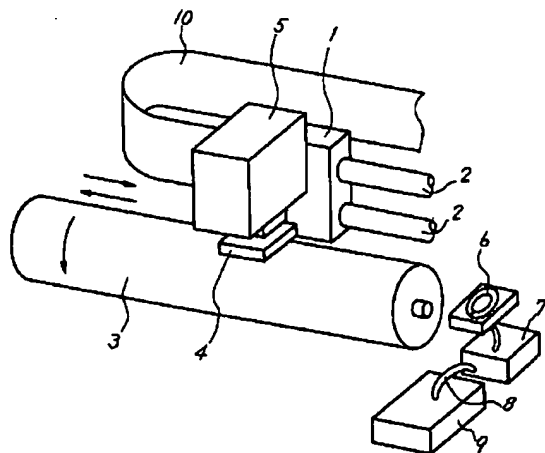


【図3】

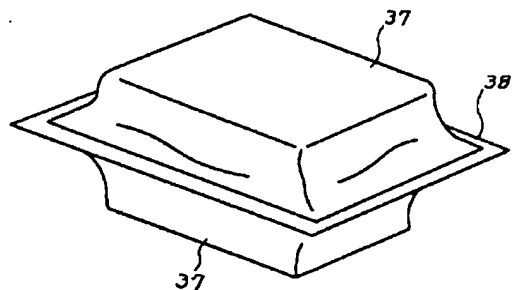


【図4】

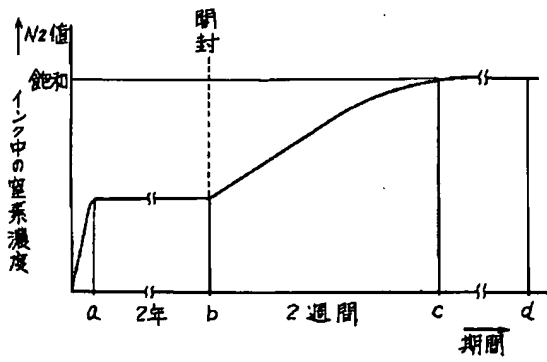
【図2】



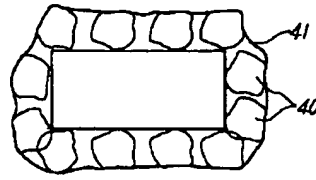
【図5】



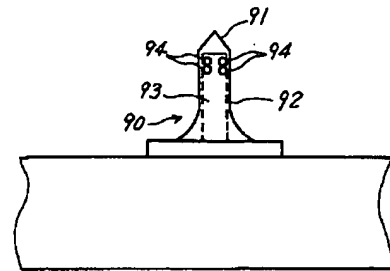
【図6】



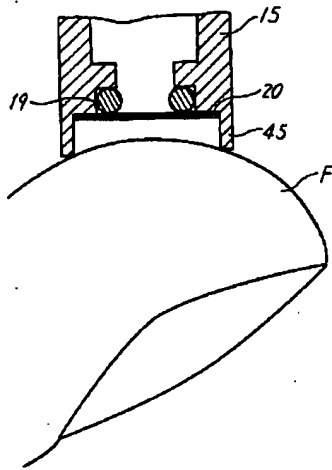
【図7】



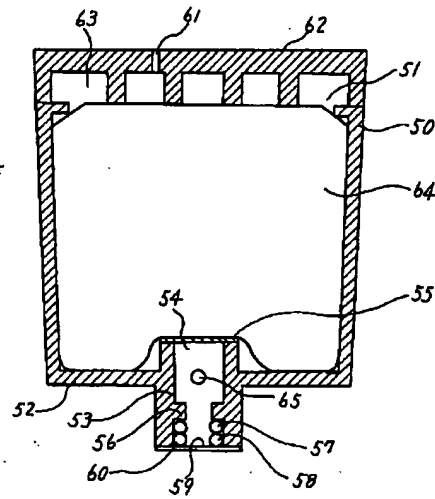
【図12】



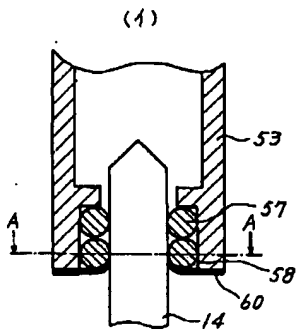
【図8】



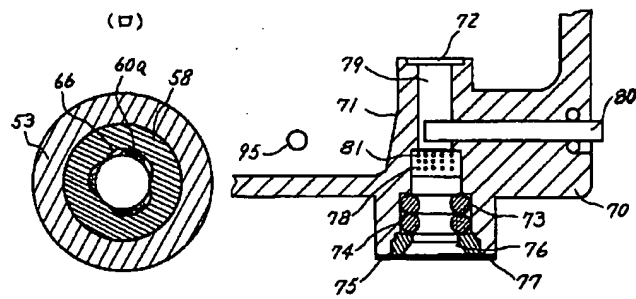
【図9】



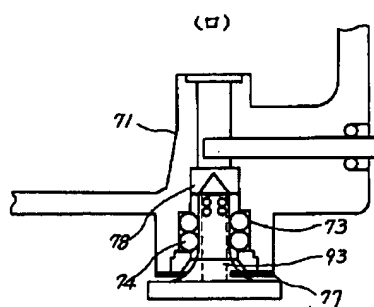
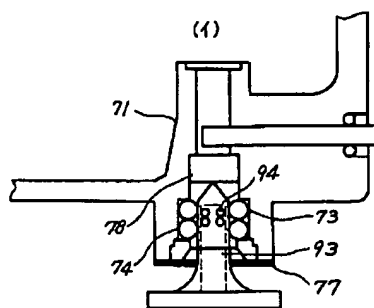
【図10】



【図11】



【図 13】



フロントページの続き

(72)発明者 大島 敬一
長野県諏訪市大和3丁目3番5号 セイコ
ーエプソン株式会社内

(72)発明者 吉田 昌敬
長野県諏訪市大和3丁目3番5号 セイコ
ーエプソン株式会社内

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2. **** shows the word which can not be translated.

3. In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] The ink cartridge for ink jet recording devices which is equipped with the porous body for ink absorption ****(ed) by the ink supply needle of the body of an ink jet recording device by infixing a filter in a removable container at the container side of the ink output port which projects from the front flesh side of the base, and this output port, prepares the packing member which **** on the periphery of an ink supply needle at the head of said ink output port, and comes to close head opening by the sealant which can penetrate said ink supply needle.

[Claim 2] The ink cartridge for ink jet recording apparatus of claim 1 which said packing member consists of with the elastic ring.

[Claim 3] The ink output port which projects from the front flesh side of the base in a container removable to the ink supply needle of the body of an ink jet recording device, The packing member which is equipped with the porous body for ink absorption ****(ed) by infixing a filter in the container side of this output port, and **** to the proximal region of said ink output port at the periphery of an ink supply needle, The ink cartridge for ink jet recording apparatus which comes to prepare a means to eliminate the fragment of said sealant, between the sealant which can penetrate said ink supply needle and closes said opening, and said packing member and sealant.

[Claim 4] Said packing member and the ink cartridge for ink jet recording apparatus of claim 3 which both sealant abatement means consist of with the elastic ring.

[Claim 5] The ink cartridge for ink jet recording apparatus of claims 1 and 3 from which a porosity elastic member is held in the field in which the through-hole of an ink supply needle is located, and the ink reservoir is secured between said porosity elastic members and said filters.

[Claim 6] The ink output port which projects from the front flesh side of the base in a container removable to the ink supply needle of the body of an ink jet recording device, It has the porous body for ink absorption ****(ed) by infixing a filter in the container side of this output port.

While preparing the packing member which **** on the periphery of an ink supply needle at the head of said ink output port and closing head opening by the sealant which can penetrate said ink supply needle The ink cartridge for ink jet recording apparatus which holds in an airtight container in the state of reduced pressure, and becomes it so that the space of about 15% of floor area ratios may be held at least.

[Claim 7] Said space is the ink cartridge for ink jet recording apparatus of claim 6 secured by the space of the container upper part.

[Claim 8] Said space is the ink cartridge for ink jet recording apparatus of claim 6 secured with the shock absorbing material which carried out the said package to said airtight container.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates direct ink to the structure of the ink cartridge suitable for the ink jet recording apparatus which performs discharge record on a record medium.

[0002]

[Description of the Prior Art] Ink supply to the recording head of an ink jet recording apparatus is performed by the ink tank constituted by the cartridge format. Thus, since air bubbles tend to invade while it is dramatically useful when preventing contamination by leakage of ink etc. at the time of ink makeup, the ink tank constituted by cartridge formation is proposed [that it is various and] about the policy which prevents trespass of air bubbles. What was indicated by JP,3-92356,A among such techniques Constitute the ink output port of the ink tank lower part from a rubber stopper, make this rubber stopper penetrate a metallic ink supply needle, and it connects with the ink passage to a recording head. For this reason, ink feed holes with a diameter of about 1mm are prepared in that side face, and the ink supply needle is constituted while forming the head of the pipe equipped with the corrosion resistance of stainless steel etc. very sharp, so that penetration of a rubber stopper may be possible. For this reason, it has the problem that it will be injured if unprepared handling is performed.

[0003] In order to solve such a problem, the packing material which has a through-hole beforehand is formed at the head of an ink feed hopper, this through-hole is closed by the sealant, and what enabled insertion of the ink supply needle which is not not much sharp is proposed (JP,50-74341,A).

[0004] However, since ink is held with the liquid, the ink tank is holding leakage of the ink at the time of insertion of an ink supply needle, and a possibility of producing a water head difference again.

[0005] By the way, in order to make it print by being stabilized on the head of an ink jet recording device, it is very effective to maintain the supply pressure of the ink from an ink tank to a recording head at the negative pressure of -30 - -100mmAq (water head) extent, and if it is in the ink jet recording device which carried the recording head and the ink tank especially on carriage, it is difficult [it] to adjust the supply pressure of ink in the installation height of an ink tank. In order to solve such a problem, holding a porosity absorber in an ink cartridge and producing negative pressure between an ink tank and a recording head by the capillarity of this is also proposed (JP,2-187364,A).

[0006]

[Problem(s) to be Solved by the Invention] However, this is the thing of a format which really exchanges a recording head for an ink tank as a configuration, when the ink in an ink tank is lost, and neither the inflow of the air to the recording head produced in case only an ink tank is exchanged selectively, nor leakage of ink is taken into consideration at all to various problems. It is offering the ink cartridge suitable for an ink jet recording device which this invention's can be made in view of such a situation, and can prevent the gaseous trespass to the ink supply passage of the body of a recording device at the time of exchange of an ink tank, without the place made into the object needing a sharp configuration at a head, and can secure the high airtightness of an ink supply needle and an ink tank.

[0007]

[Means for Solving the Problem] In order to solve such a problem, it sets to this invention. In the thing equipped with the porous body for ink absorption ****(ed) by the ink supply needle of the body of an ink jet recording device by infixing a filter in a removable container at the container side of the ink output port which projects from the front flesh side of the base, and this output port The packing member which **** on the periphery of an ink supply needle is prepared at the head of said ink output port, and head opening was closed by the sealant which can penetrate said ink supply needle.

[0008]

[Function] If a cartridge is inserted in an ink supply needle, the head of an ink supply needle will penetrate a sealant, will pass the packing material of the upper part of this, and will be open for free passage with the ink absorbed by the porous body. By this, an ink supply needle will be closed with a packing material, will open a perimeter for free passage with the ink of a cartridge in the state of fluid-tight, will maintain fixed negative pressure between recording heads with the surface tension of a porous body, and will supply ink to a recording head.

[0009]

[Example] Then, based on the example illustrating the detail of this invention, it explains below. Drawing 2 shows an example of an ink jet recording device which has the ink cartridge of this invention used, the sign 1 in drawing is the carriage arranged in guides 2 and 2 by the shaft orientations of a platen 3 possible [reciprocation], and the ink jet recording head 4 which injects an ink droplet in accordance with a printing signal, and the ink cartridge 5 which supplies ink to this are carried in this. 6 is cap equipment arranged outside a printing field, while preventing desiccation of a nozzle orifice in contact with the front face of a recording head 4 during an idle period, the time of exchange of an ink cartridge 5, and when ink regurgitation capacity declines, seal a nozzle orifice, make the negative pressure from a suction pump 7 act, ink is made to breathe out compulsorily, and hold storage of the attracted ink is carried out with a pipe 8 at the waste ink tank 9. In addition, the sign 10 in drawing shows the cable which transmits a printing signal to a recording head 4.

[0010] Drawing 1 shows one example of the ink cartridge of this invention, where a recording apparatus is equipped, and it is the container which constitutes the body of an ink cartridge, and the sign 11 in drawing forms in one the ink output port 15 which engages with the perimeter of the ink supply needle 14 elastically in a base 13, and is constituted [the upper part is equipped with opening 12, it is formed in the taper configuration so that it may be taper off a little at a base side, and]. Ink output port 15 is formed in the shape of [in which the ends projected from the base] a pipe, and joining immobilization of the filter 17 using the size 20 of the grid constituted with polymeric materials or a corrosion-resistant metal thru/or the stainless steel mesh of 100 MIKURUMME-torr extent is carried out at the opening 16 which projects inside the ink container 11. A level difference 18 is formed in the inner surface center section of ink output port 15, and the ring made of rubber and so-called O ring 19 are formed in the packing material which **** to the ink supply needle 14 and maintains a fluid-tight condition to a head opening side, and this example. Joining of the sealant which is not damaged by high airtightness and the external force by contact etc. to opening 15, and closes penetration of an ink supply needle if , for example, a high polymer film, and the film 20 which laminated the metal layer in the high polymer film is carried out.

[0011] 21 is a porous body, and where a cross section is larger than the opening 12 of a container 11 a little, and height is formed in oversized a little rather than the height of a container, the soffit section ****(ed) in the filter 17 of ink output port 15, and it was compressed according to

the configuration of ink output port 15 and the circumference is pressed with the side attachment wall of a container 11, it is held in the container 11. 22 is a lid and is equipped with the atmospheric-air free passage opening 23 and the ribs 25 and 25 for oppressing a porous body 21 and securing the space 24 and 24 about ** in a cartridge.

[0012] 26 and 27 are the condition that the ink of a cartridge 5 exists only in the ink feed hopper 12, and the electrode 18 which detects the so-called ink near end, and it is prepared so that one side may be located in the pars basilaris ossis occipitalis of a container 11 and another side may be located in the ink feed hopper 15. As shown in these electrodes 26 and 27 at drawing 4, the alternation electrical potential difference V_{cc} is impressed through Resistance R, a differential circuit 30 detects an inter-electrode electrical-potential-difference change, and a comparison circuit 31 compares the electrical-potential-difference rate of change and set point, and event [the event of becoming larger than the set point], i.e., when the ink of a porous body 21 decreases and the whole ink residue is decreasing rapidly, it is used in order to output a signal.

[0013] On the other hand, two or more through-holes 36, 36, 36, and 36 by which the head is formed in the shape of a cone, and the ink supply needle 14 which cooperates with a cartridge connects the ink and the supply way 35 of a cartridge to the apical surface 34 are drilled.

[0014] thus, it will come out to make each pore of a porous body 21, as for the constituted ink container, absorb ink under reduced pressure of 0.2 thru/or 0.4 atmospheric-pressure extent, and it will fill up with ink. Ink enclosure under such reduced pressure is technique very useful as shown in JP,60-245560,A, when stabilizing a quality of printed character. In the phase which restoration of ink ended, a cartridge will be packed into the bag which consists of a laminate film which has, airtight high ingredient, for example, aluminum layer, and shipment will be equipped with it.

[0015] Drawing 5 shows one example of the package gestalt of the above-mentioned ink cartridge, and airtightness wraps in a cartridge in the sandwiches condition with the very high aluminum laminate film 37 of two sheets, and decompresses internal air, and it carries out thermocompression bonding of the periphery section 38. By the way, since distance is in the location where an ink restoration activity and a package are usually performed although how to close by the vacua very higher than the time of ink restoration, such as 20 or less Torrs, is also considered as it was shown in JP,3-61592,B, although it was about the size of the pressure at the time of a package, the cartridge will be temporarily exposed to atmospheric pressure. for this reason, the air which melted the bigger negative pressure at the time of a package bag than the time of restoration into ink from an ink restoration activity before the package when the pressure was put -- from ink -- separating -- air bubbles -- generating -- ink -- leaking -- appearance -- carrying out -- etc. -- the air bubbles produced in the porous body will bar runoff of the ink from a cartridge to a recording head, and there is not only a possibility that it may be generated, but they will cause an ink piece at the time of printing. In order to avoid such a problem, it found out that it was more desirable than the pressure at the time of the ink restoration to a container 11 to pack under the negative pressure from atmospheric pressure a little.

[0016] If it is in some which generate gas by decomposition like the ink using a color, by reduced pressure space being secured in a package bag, it can lessen that gas melts in ink as much as possible, and degradation of a quality of printed character can be prevented. Moreover, even if it uses what is not deaerated as ink for restoration, reduced pressure space not only enables it to promote deaeration during preservation, but it can prevent the ink leakage to the exterior from a package bag.

[0017] Next, the nitrogen volume which is the principal component of air about whenever [after the retention period in a vacuum-packaging condition / reduced pressure value / at the time of vacuum packaging / and ink deaeration] is explained for a parameter.

[0018]

[A table 1]

[0019] According to the experiment, by controlling the pressure at the time of a package, whenever [deaeration / of the ink in the ink cartridge at the time of package opening] can be adjusted. A table 1 shows the concentration of Chisso which is by ***** to the ink in the package pressure (gage pressure of negative pressure) when fixing Chisso concentration at the time of a package with the saturation value of about 13-14 ppm, and the ink cartridge in an opening event. Next, after opening, the nitrogen volume in ink is taken in a parameter, and the situation of change of whenever [deaeration / of the ink in an ink tank] is explained. Drawing 6 shows change of the nitrogen volume from immediately after opening. Since the ink cartridge has the space by which formation reservation was carried out with the rib in the upper part, it exists in a package from the early stages of a package of fixed air according to a reduced pressure value. Since this accumulates, the nitrogen concentration in ink increases from immediately after a package rapidly within a short period of time, it settles in constant value after that and airtightness is held with a package bag, constant value is maintained henceforth. At least a year can maintain such a condition generally from manufacture. And nitrogen volume rises one by one from b points among opened drawing. The nitrogen volume in ink reaches atmospheric-air saturation in about one week after opening. The period 1 required using one cartridge even if it is in this condition thru/or about 4 round room, it checked that printing quality was maintainable on practical use level.

[0020] Here explains the effectiveness by deaeration of ink. In case an ink tank is taken out and inserted to a hollow needle, the amount of the air mixed from a hollow needle is very usually a minute amount. In the check by experiment, when the ink inflow aperture of a hollow needle was a diameter of about 0.8mm, even if there were many amounts of the air to mix, they were below 0.4 cube mm extent for a meniscus. The air mixed once flows toward a recording head, and a trap is reached and carried out to the filter (un-illustrating) of the filter interior of a room. Since this air by which the trap was carried out has the very detailed eye granularity of a filter, a filter is not passed easily. When the space width of face of the 4mm and the filter interior of a room was about 0.3-0.5mm according to the experiment, this air did not pass [the count of extraction and insertion of an ink tank] a filter by record actuation as a 10 - ten number line. [diameter / filter] If it is mixing of air of this level, in case deaeration ink can be clearly supplied to a recording head during the period to C of drawing 6 and this will take out and insert an ink tank to a hollow needle, the air mixed from the hollow needle does not become ink with a penetration problem. However, when left with the ink tank removed carelessly removed more from the hollow needle, it will mix from an ink supply needle. since the air which dissolved in ink needless to say destroys a siphon phenomenon, it causes the poor regurgitation -- things -- ** In such a case, it had and the ink jet recording device is equipped with the suction pump for making negative pressure act on a recording head, and making ink breathe out compulsorily. Also in this case, it became clear from the experiment by whenever [deaeration / of ink when inconvenience occurs] that a big difference was in whenever [recovery]. If it is ink by about two - four weeks after opening shown by drawing 6 , there will be no nonconformity in carrying out attraction

clearance of the air of the filter interior of a room with a suction pump in any way. However, when it passes over this period, full saturation and when it changes into a supersaturation condition by fluctuation of atmospheric temperature further, in response to an operation of the negative pressure by recovery operation, minute air bubbles will generate the air content in ink in ink, and this will cause the poor regurgitation.

[0021] that drawing 7 indicates other examples of the package approach of an ink cartridge to be -- it is -- a cartridge -- the sponge grains 40, 40, and 40 -- it wraps in shock absorbing material, such as, and holds in the above-mentioned package bag 41, and reduced pressure processing is performed in this condition. According to this example, since it becomes possible to secure space in a package bag by shock absorbing material 40 and 40, even if it fills up a porous body 21 with about 95% of the volume of many, for example, the appearance of a porous body, as much as possible, it becomes possible to maintain the reduced pressure condition at the time of a package over a long period of time, and improvement in a quality of printed character and improvement in an ink charging efficiency can be aimed at.

[0022] Thus, when using the cartridge supplied in the state of the package, alignment of the head opening of ejection and ink output port 15 is carried out for a cartridge to the ink supply needle 14 from a package bag, and a cartridge is stuffed into the ink supply needle 14 at parallel. In this process, the ink supply needle 14 penetrates a sealant 20, and reaches a packing material 19. the point of the ink supply needle 14 will be in the ink feed hopper 15 and a fluid-tight condition through a packing material 19 by this, and open for free passage with the ink in a feed hopper 15 -- things -- ** In case the ink supply needle 14 penetrates a sealant 20, a sealant 20 deforms [whether it is made to the head configuration of the supply needle 14 with the elasticity and], and prevents mixing of air.

[0023] By the way, since the through-holes 36 and 36 and 36 which were formed at the head of the ink supply needle 14 are chosen as a diameter 0.1 thru/or 0.4mm or less, MENISUKA is held also at the time of exchange of a cartridge, and trespass of the air from the ink supply needle 14 to a recording head is suppressed. Moreover, since two or more through-holes 36, 36, 36, and 36 are formed, the flow resistance to the ink which passes through this is small as much as possible, and the ink of the amount which does not cause trouble to printing is supplied to a recording head 4. And since it is inserting in this in the condition of having made the head of ink output port 15 transforming a porous body 21 elastically, it is smaller than the field of others [pore / of the porous body in the field near the ink output port / path / the], and the capillary tube force over ink is large relatively. For this reason, it becomes possible to centralize ink on this part, and it becomes possible to discharge ink to a recording head to the last, without inviting an ink piece.

[0024] In addition, although he is trying to expose the sealant 20 of the ink feed hopper 15 in an above-mentioned example, if the edge 45 is formed so that a sealant 20 may be surrounded as shown in drawing 8 , it can respond to an operation of the external force by contact of the unprepared finger F etc. at a edge 45, and it not only can prevent breakage of a sealant 20, but can insert the ink supply needle 14 easily by using this edge as an advice member.

[0025] The sign 50 in drawing is the container which constitutes the body of an ink cartridge, by drawing 9 showing other examples of the ink cartridge of this invention, it forms in a taper configuration so that a base side may be tapering off a little in preparation for the upper part about opening 51, and the ink output port 53 which engages with the ink supply needle 14 formed in the body of a recording device mentioned later is formed in a base 52 in the shape of a pipe, and it is constituted. Ink output port 53 is formed in the shape of [in which the ends

projected from the base] a pipe, and joining immobilization of the filter 55 constituted with polymeric materials or a corrosion-resistant metal is carried out at the opening 54 which projects inside the ink container 50. A level difference 56 is formed in the inner surface center section of ink output port 53, the ring made of rubber and so-called O ring 57 are formed in the packing material which **** to the ink supply needle 14 and maintains a fluid-tight condition to a head opening side, and this example, and O ring 58 is inserted up and down in the seal film presser-foot member later mentioned to the this down side, and this example. Opening 59 is closed by the film 60 on which is equipped with high airtightness, and penetration of an ink supply needle is closed if, for example, the sealant which consists of a laminate film. On the other hand, opening 51 is closed with the lid 62 which has the atmospheric-air free passage opening 61, and space 63 is secured in the upper part of a container 50. In addition, the sign 64 in drawing shows the porous body for ink absorption, and 65 shows the electrode for ink near end detection.

[0026] Thus, deaeration ink is filled up with the bottom of reduced pressure into the constituted ink cartridge like the above-mentioned case, it is enclosed with a package bag and it is kept so that the negative pressure of atmospheric pressure side approach may be maintained a little rather than the time of ink restoration. When exchanging the cartridge of a recording apparatus, alignment of the head opening of ejection and ink output port 53 is carried out for a cartridge to the ink supply needle 14 from a package bag, and a cartridge is stuffed into the ink supply needle 14 at parallel. In this process, the ink supply needle 14 penetrates a seal 60, passes the seal inhibition material 58, and reaches a packing material 57. The through-hole 36 of the ink supply needle 14 and 36 are open for free passage with the ink feed hopper 15 by this, and the perimeter of the ink supply needle 14 has a fluid-tight condition held by the packing material 57. By the way, although a part of sealant 60 may invade in a feed hopper with the supply needle 14 in case the ink supply needle 14 penetrates a sealant 60, fragment 60a of a sealant 60 has migration in the upper part obstructed by the inhibition material 58 (drawing 10 I, RO), and does not reach a packing material 57. Consequently, even if space 66 is generated between the inhibition material 58 and the ink supply needle 14, fluid-tight nature is secured from this with the packing material 57 located in an ink side, and leakage of ink is prevented.

[0027] Drawing 11 shows the 3rd example of this invention, it is the base of a container in which a porous body for ink absorption which was mentioned above is held, and the pipe-like ink feed hopper 71 is formed here the same with having mentioned above, and the sign 70 in drawing is ****(ed) by opening of an upper bed through the filter 72 at the porous body for the above-mentioned ink absorption. A packing material 73 and the sealant inhibition member 74 are inserted in the center section of the ink feed hopper 71, a bush 75 is fixed, and opening 76 is closed by the sealant 77. 78 is the porous body prepared between the electrodes 80 for ink near end detection and sealants 73 which were prepared in the ink ** room 79, and it is positioned so that it may be stopped with a level difference 81 and may not move by insertion of an ink supply needle in the upper part, either. In addition, the sign 95 in drawing shows the electrode of another side for ink detection.

[0028] The almost horizontal openings 94, 94, and 94 are formed so that drawing 12 may show one example of the ink supply needle 90 suitable for the ink cartridge mentioned above, and may be equipped with the point 91 of the shape of the shape of a cone which closes insertion to a sealant 77, the inhibition material 74, and a packing material 73 if, and a slant face and it may be open for free passage to the internal feed hopper 93 at the body section 92.

[0029] If the sealant 77 of a cartridge is positioned to the ink supply needle 90 in this example and a cartridge is pushed in, the ink supply needle 90 will penetrate a sealant 77, and will pass

the sealant inhibition member 74 and a packing material 73. since the point 91 is closed, the ink supply needle 90 has it prevented for it to be thought as a point 91 with a packing material 73, and to get across to a through-hole 93 (drawing 13 I), and escapes from the volume change of the ink reservoir room 79 produced according to the piston effectiveness produced in a cartridge insertion process in the upper part via the porous body 78 of an ink feed hopper -- things -- ** Thus, when the openings 94 and 94 of the ink supply needle 90 and 94 pass a packing material 73, missing the pressure of the ink feed hopper in a cartridge insertion process to a container side, ink is made to flow into a through-hole 93 through openings 94, 94, and 94 (this drawing RO).

[0030] Thus, in an ink cartridge insertion process, since a free passage with the through-hole 93 of an ink supply needle and the ink feed hopper 71 is severed, it can happen at the time of cartridge insertion, the volume change by the piston effectiveness to a recording head [win] can be prevented, the ink from the nozzle orifice of a recording head 4 can ooze, and ** can be prevented. Moreover, since it is not necessary to drill a through-hole in a point and sufficient reinforcement for an ink supply needle can be made to secure, it becomes possible to constitute a supply needle with ingredients other than a metal, for example, polymeric materials, and the simplification of a manufacture process and danger peculiar to a metal needle can be avoided. Since suitable passage resistance is securable by choosing it as the through-holes 94 and 94 drilled even if it enlarges the outer diameter of an ink supply needle, and extent of 94 which can hold MENISUKA for a bore, even if it fabricates an ink supply needle by polymeric materials, it becomes possible to secure the reinforcement which is equal to cartridge insertion.

[0031] By the way, when a cartridge is removed from an ink supply needle in spite of the condition that ink remains on account of a maintenance etc., the ink which exists near the ink supply needle head is absorbed to the porous body 78 located in the near according to the capillary tube force of the porous body for ink absorption in a cartridge. And since this porous body 78 has the capillary tube force almost equivalent to the porous body for ink absorption held in the cartridge body, ink will remain in the ink ** room 79. For this reason, even if it can prevent trespass of the air bubbles by the desorption of a cartridge and carries out desorption of the cartridge, when the output of an ink near end signal can be avoided and an ink near end signal will be outputted as a result, even if return actuation is a troublesome ink jet recording device, printing can be resumed only by re-equipping.

[0032] In addition, although the case where the ink supply needle with which the through-hole was horizontally drilled in the 3rd example was used was explained, when the piston effectiveness at the time of cartridge insertion is small, it is clear that the ink supply needle which has a through-hole at a head as shown in drawing 3 is usable. Moreover, stop material is used so that the 3rd example may set and it may prevent omission of a packing material and a sealant inhibition member, but omitting is possible when the rigidity of a sealant is comparatively large.

[0033]

[Effect of the Invention] The ink output port which projects from the front flesh side of the base in this invention in a container removable to the ink supply needle of the body of an ink jet recording device as mentioned above, It has the porous body for ink absorption ****(ed) by infixing a filter in the container side of output port. Since the packing member which **** on the periphery of an ink supply needle was prepared at the head of ink output port and head opening of output port was closed by the sealant which can penetrate an ink supply needle Without needing a sharp configuration at a head, the gaseous trespass to the ink supply passage of the

body of a recording device can be prevented at the time of exchange of an ink tank, and the high airtightness of an ink supply needle and an ink tank can be secured.

TECHNICAL FIELD

[Industrial Application] This invention relates direct ink to the structure of the ink cartridge suitable for the ink jet recording apparatus which performs discharge record on a record medium.

PRIOR ART

[Description of the Prior Art] Ink supply to the recording head of an ink jet recording apparatus is performed by the ink tank constituted by the cartridge format. Thus, since air bubbles tend to invade while it is dramatically useful when preventing contamination by leakage of ink etc. at the time of ink makeup, the ink tank constituted by cartridge formation is proposed [that it is various and] about the policy which prevents trespass of air bubbles. What was indicated by JP,3-92356,A among such techniques constitutes the ink output port of the ink tank lower part from a rubber stopper, makes this rubber stopper penetrate a metallic ink supply needle, and connects with the ink passage to a recording head. For this reason, ink feed holes with a diameter of about 1mm are prepared in that side face, and the ink supply needle is constituted while forming the head of the pipe equipped with the corrosion resistance of stainless steel etc. very sharp, so that penetration of a rubber stopper may be possible. For this reason, it has the problem that it will be injured if unprepared handling is performed.

[0003] In order to solve such a problem, the packing material which has a through-hole beforehand is formed at the head of an ink feed hopper, this through-hole is closed by the sealant, and what enabled insertion of the ink supply needle which is not not much sharp is proposed (JP,50-74341,A).

[0004] However, since ink is held with the liquid, the ink tank is holding leakage of the ink at the time of insertion of an ink supply needle, and a possibility of producing a water head difference again.

[0005] By the way, in order to make it print by being stabilized on the head of an ink jet recording device, it is very effective to maintain the supply pressure of the ink from an ink tank to a recording head at the negative pressure of -30 - -100mmAq (water head) extent, and if it is in the ink jet recording device which carried the recording head and the ink tank especially on carriage, it is difficult [it] to adjust the supply pressure of ink in the installation height of an ink tank. In order to solve such a problem, holding a porosity absorber in an ink cartridge and producing negative pressure between an ink tank and a recording head by the capillarity of this is also proposed (JP,2-187364,A).

EFFECT OF THE INVENTION

[Effect of the Invention] As mentioned above, by this invention, it had the porous body for ink absorption ****(ed) by the ink supply needle of the body of an ink jet recording device by infixing a filter in a removable container at the container side of the ink output port which

projects from the front flesh side of the base, and output port, the packing member which **** on the periphery of an ink supply needle was prepared at the head of ink output port, and head opening of output port was closed by the sealant which can penetrate an ink supply needle. Therefore, without needing a sharp configuration at a head, the gaseous trespass to the ink supply passage of the body of a recording device can be prevented at the time of exchange of an ink tank, and the high airtightness of an ink supply needle and an ink tank can be secured.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, this is the thing of a format which really exchanges a recording head for an ink tank as a configuration, when the ink in an ink tank is lost, and neither the inflow of the air to the recording head produced in case only an ink tank is exchanged selectively, nor leakage of ink is taken into consideration at all to various problems. It is offering the ink cartridge suitable for an ink jet recording device which this invention's can be made in view of such a situation, and can prevent the gaseous trespass to the ink supply passage of the body of a recording device at the time of exchange of an ink tank, without the place made into the object needing a sharp configuration at a head, and can secure the high airtightness of an ink supply needle and an ink tank.

MEANS

[Means for Solving the Problem] In order to solve such a problem, it sets to this invention. In the thing equipped with the porous body for ink absorption ****(ed) by the ink supply needle of the body of an ink jet recording device by infixing a filter in a removable container at the container side of the ink output port which projects from the front flesh side of the base, and this output port The packing member which **** on the periphery of an ink supply needle is prepared at the head of said ink output port, and head opening was closed by the sealant which can penetrate said ink supply needle.

OPERATION

[Function] If a cartridge is inserted in an ink supply needle, the head of an ink supply needle will penetrate a sealant, will pass the packing material of the upper part of this, and will be open for free passage with the ink absorbed by the porous body. By this, an ink supply needle will be closed with a packing material, will open a perimeter for free passage with the ink of a cartridge in the state of fluid-tight, will maintain fixed negative pressure between recording heads with the surface tension of a porous body, and will supply ink to a recording head.

EXAMPLE

[Example] Then, based on the example illustrating the detail of this invention, it explains below. Drawing 2 shows an example of an ink jet recording device which has the ink cartridge of this

invention used, the sign 1 in drawing is the carriage arranged in guides 2 and 2 by the shaft orientations of a platen 3 possible [reciprocation], and the ink jet recording head 4 which injects an ink droplet in accordance with a printing signal, and the ink cartridge 5 which supplies ink to this are carried in this. 6 is cap equipment arranged outside a printing field, while preventing desiccation of a nozzle orifice in contact with the front face of a recording head 4 during an idle period, the time of exchange of an ink cartridge 5, and when ink regurgitation capacity declines, seal a nozzle orifice, make the negative pressure from a suction pump 7 act, ink is made to breathe out compulsorily, and hold storage of the attracted ink is carried out with a pipe 8 at the waste ink tank 9. In addition, the sign 10 in drawing shows the cable which transmits a printing signal to a recording head 4.

[0010] Drawing 1 shows one example of the ink cartridge of this invention, where a recording apparatus is equipped, and it is the container which constitutes the body of an ink cartridge, and the sign 11 in drawing forms in one the ink output port 15 which engages with the perimeter of the ink supply needle 14 elastically in a base 13, and is constituted [the upper part is equipped with opening 12, it is formed in the taper configuration so that it may be taper off a little at a base side, and]. Ink output port 15 is formed in the shape of [in which the ends projected from the base] a pipe, and joining immobilization of the filter 17 using the size 20 of the grid constituted with polymeric materials or a corrosion-resistant metal thru/or the stainless steel mesh of 100 MIKURUMME-torr extent is carried out at the opening 16 which projects inside the ink container 11. A level difference 18 is formed in the inner surface center section of ink output port 15, and the ring made of rubber and so-called O ring 19 are formed in the packing material which **** to the ink supply needle 14 and maintains a fluid-tight condition to a head opening side, and this example. Joining of the sealant which is not damaged by high airtightness and the external force by contact etc. to opening 15, and closes penetration of an ink supply needle if, for example, a high polymer film, and the film 20 which laminated the metal layer in the high polymer film is carried out.

[0011] 21 is a porous body, and where a cross section is larger than the opening 12 of a container 11 a little, and height is formed in oversized a little rather than the height of a container, the soffit section ****(ed) in the filter 17 of ink output port 15, and it was compressed according to the configuration of ink output port 15 and the circumference is pressed with the side attachment wall of a container 11, it is held in the container 11. 22 is a lid and is equipped with the atmospheric-air free passage opening 23 and the ribs 25 and 25 for oppressing a porous body 21 and securing the space 24 and 24 about ** in a cartridge.

[0012] 26 and 27 are the condition that the ink of a cartridge 5 exists only in the ink feed hopper 12, and the electrode 18 which detects the so-called ink near end, and it is prepared so that one side may be located in the pars basilaris ossis occipitalis of a container 11 and another side may be located in the ink feed hopper 15. As shown in these electrodes 26 and 27 at drawing 4, the alternation electrical potential difference V_{cc} is impressed through Resistance R, a differential circuit 30 detects an inter-electrode electrical-potential-difference change, and a comparison circuit 31 compares the electrical-potential-difference rate of change and set point, and event [the event of becoming larger than the set point], i.e., when the ink of a porous body 21 decreases and the whole ink residue is decreasing rapidly, it is used in order to output a signal.

[0013] On the other hand, two or more through-holes 36, 36, 36, and 36 by which the head is formed in the shape of a cone, and the ink supply needle 14 which cooperates with a cartridge connects the ink and the supply way 35 of a cartridge to the apical surface 34 are drilled.

[0014] thus, it will come out to make each pore of a porous body 21, as for the constituted ink container, absorb ink under reduced pressure of 0.2 thru/or 0.4 atmospheric-pressure extent, and it will fill up with ink. Ink enclosure under such reduced pressure is technique very useful as shown in JP,60-245560,A, when stabilizing a quality of printed character. In the phase which restoration of ink ended, a cartridge will be packed into the bag which consists of a laminate film which has, airtight high ingredient, for example, aluminum layer, and shipment will be equipped with it.

[0015] Drawing 5 shows one example of the package gestalt of the above-mentioned ink cartridge, and airtightness wraps in a cartridge in the sandwiches condition with the very high aluminum laminate film 37 of two sheets, and decompresses internal air, and it carries out thermocompression bonding of the periphery section 38. By the way, since distance is in the location where an ink restoration activity and a package are usually performed although how to close by the vacua very higher than the time of ink restoration, such as 20 or less Torrs, is also considered as it was shown in JP,3-61592,B, although it was about the size of the pressure at the time of a package, the cartridge will be temporarily exposed to atmospheric pressure. for this reason, the air which melted the bigger negative pressure at the time of a package bag than the time of restoration into ink from an ink restoration activity before the package when the pressure was put -- from ink -- separating -- air bubbles -- generating -- ink -- leaking -- appearance -- carrying out -- etc. -- the air bubbles produced in the porous body will bar runoff of the ink from a cartridge to a recording head, and there is not only a possibility that it may be generated, but they will cause an ink piece at the time of printing. In order to avoid such a problem, it found out that it was more desirable than the pressure at the time of the ink restoration to a container 11 to pack under the negative pressure from atmospheric pressure a little.

[0016] If it is in some which generate gas by decomposition like the ink using a color, by reduced pressure space being secured in a package bag, it can lessen that gas melts in ink as much as possible, and degradation of a quality of printed character can be prevented. Moreover, even if it uses what is not deaerated as ink for restoration, reduced pressure space not only enables it to promote deaeration during preservation, but it can prevent the ink leakage to the exterior from a package bag.

[0017] Next, the nitrogen volume which is the principal component of air about whenever [after the retention period in a vacuum-packaging condition / reduced pressure value / at the time of vacuum packaging / and ink deaeration] is explained for a parameter.

[0018]

[A table 1]

[0019] According to the experiment, by controlling the pressure at the time of a package, whenever [deaeration / of the ink in the ink cartridge at the time of package opening] can be adjusted. A table 1 shows the concentration of Chisso which is by ***** to the ink in the package pressure (gage pressure of negative pressure) when fixing Chisso concentration at the time of a package with the saturation value of about 13-14 ppm, and the ink cartridge in an opening event. Next, after opening, the nitrogen volume in ink is taken in a parameter, and the situation of change of whenever [deaeration / of the ink in an ink tank] is explained. Drawing 6 shows change of the nitrogen volume from immediately after opening. Since the ink cartridge has the space by which formation reservation was carried out with the rib in the upper part, it exists in a package from the early stages of a package of fixed air according to a reduced

pressure value. Since this accumulates, the nitrogen concentration in ink increases from immediately after a package rapidly within a short period of time, it settles in constant value after that and airtightness is held with a package bag, constant value is maintained henceforth. At least a year can maintain such a condition generally from manufacture. And nitrogen volume rises one by one from b points among opened drawing. The nitrogen volume in ink reaches atmospheric-air saturation in about one week after opening. The period 1 required using one cartridge even if it is in this condition thru/or about 4 round room, it checked that printing quality was maintainable on practical use level.

[0020] Here explains the effectiveness by deaeration of ink. In case an ink tank is taken out and inserted to a hollow needle, the amount of the air mixed from a hollow needle is very usually a minute amount. In the check by experiment, when the ink inflow aperture of a hollow needle was a diameter of about 0.8mm, even if there were many amounts of the air to mix, they were below 0.4 cube mm extent for a meniscus. The air mixed once flows toward a recording head, and a trap is reached and carried out to the filter (un-illustrating) of the filter interior of a room. Since this air by which the trap was carried out has the very detailed eye granularity of a filter, a filter is not passed easily. When the space width of face of the 4mm and the filter interior of a room was about 0.3-0.5mm according to the experiment, this air did not pass [the count of extraction and insertion of an ink tank] a filter by record actuation as a 10 - ten number line. [diameter / filter] If it is mixing of air of this level, in case deaeration ink can be clearly supplied to a recording head during the period to C of drawing 6 and this will take out and insert an ink tank to a hollow needle, the air mixed from the hollow needle does not become ink with a penetration problem. However, when left with the ink tank removed carelessly removed more from the hollow needle, it will mix from an ink supply needle. since the air which dissolved in ink needless to say destroys a siphon phenomenon, it causes the poor regurgitation -- things -- ** In such a case, it had and the ink jet recording device is equipped with the suction pump for making negative pressure act on a recording head, and making ink breathe out compulsorily. Also in this case, it became clear from the experiment by whenever [deaeration / of ink when inconvenience occurs] that a big difference was in whenever [recovery]. If it is ink by about two - four weeks after opening shown by drawing 6 , there will be no nonconformity in carrying out attraction clearance of the air of the filter interior of a room with a suction pump in any way. However, when it passes over this period, full saturation and when it changes into a supersaturation condition by fluctuation of atmospheric temperature further, in response to an operation of the negative pressure by recovery operation, minute air bubbles will generate the air content in ink in ink, and this will cause the poor regurgitation.

[0021] that drawing 7 indicates other examples of the package approach of an ink cartridge to be -- it is -- a cartridge -- the sponge grains 40, 40, and 40 -- it wraps in shock absorbing material, such as, and holds in the above-mentioned package bag 41, and reduced pressure processing is performed in this condition. According to this example, since it becomes possible to secure space in a package bag by shock absorbing material 40 and 40, even if it fills up a porous body 21 with about 95% of the volume of many, for example, the appearance of a porous body, as much as possible, it becomes possible to maintain the reduced pressure condition at the time of a package over a long period of time, and improvement in a quality of printed character and improvement in an ink charging efficiency can be aimed at.

[0022] Thus, when using the cartridge supplied in the state of the package, alignment of the head opening of ejection and ink output port 15 is carried out for a cartridge to the ink supply needle 14 from a package bag, and a cartridge is stuffed into the ink supply needle 14 at parallel. In this

process, the ink supply needle 14 penetrates a sealant 20, and reaches a packing material 19. the point of the ink supply needle 14 will be in the ink feed hopper 15 and a fluid-tight condition through a packing material 19 by this, and open for free passage with the ink in a feed hopper 15 -- things -- ** In case the ink supply needle 14 penetrates a sealant 20, a sealant 20 deforms [whether it is made to the head configuration of the supply needle 14 with the elasticity and], and prevents mixing of air.

[0023] By the way, since the through-holes 36 and 36 and 36 which were formed at the head of the ink supply needle 14 are chosen as a diameter 0.1 thru/or 0.4mm or less, MENISUKA is held also at the time of exchange of a cartridge, and trespass of the air from the ink supply needle 14 to a recording head is suppressed. Moreover, since two or more through-holes 36, 36, 36, and 36 are formed, the flow resistance to the ink which passes through this is small as much as possible, and the ink of the amount which does not cause trouble to printing is supplied to a recording head 4. And since it is inserting in this in the condition of having made the head of ink output port 15 transforming a porous body 21 elastically, it is smaller than the field of others [pore / of the porous body in the field near the ink output port / path / the], and the capillary tube force over ink is large relatively. For this reason, it becomes possible to centralize ink on this part, and it becomes possible to discharge ink to a recording head to the last, without inviting an ink piece.

[0024] In addition, although he is trying to expose the sealant 20 of the ink feed hopper 15 in an above-mentioned example, if the edge 45 is formed so that a sealant 20 may be surrounded as shown in drawing 8 , it can respond to an operation of the external force by contact of the unprepared finger F etc. at a edge 45, and it not only can prevent breakage of a sealant 20, but can insert the ink supply needle 14 easily by using this edge as an advice member.

[0025] The sign 50 in drawing is the container which constitutes the body of an ink cartridge, by drawing 9 showing other examples of the ink cartridge of this invention, it forms in a taper configuration so that a base side may be tapering off a little in preparation for the upper part about opening 51, and the ink output port 53 which engages with the ink supply needle 14 formed in the body of a recording device mentioned later is formed in a base 52 in the shape of a pipe, and it is constituted. Ink output port 53 is formed in the shape of [in which the ends projected from the base] a pipe, and joining immobilization of the filter 55 constituted with polymeric materials or a corrosion-resistant metal is carried out at the opening 54 which projects inside the ink container 50. A level difference 56 is formed in the inner surface center section of ink output port 53, the ring made of rubber and so-called O ring 57 are formed in the packing material which **** to the ink supply needle 14 and maintains a fluid-tight condition to a head opening side, and this example, and O ring 58 is inserted up and down in the seal film presser-foot member later mentioned to the this down side, and this example. Opening 59 is closed by the film 60 on which is equipped with high airtightness, and penetration of an ink supply needle is closed if , for example, the sealant which consists of a laminate film. On the other hand, opening 51 is closed with the lid 62 which has the atmospheric-air free passage opening 61, and space 63 is secured in the upper part of a container 50. In addition, the sign 64 in drawing shows the porous body for ink absorption, and 65 shows the electrode for ink near end detection.

[0026] Thus, deaeration ink is filled up with the bottom of reduced pressure into the constituted ink cartridge like the above-mentioned case, it is enclosed with a package bag and it is kept so that the negative pressure of atmospheric pressure side approach may be maintained a little rather than the time of ink restoration. When exchanging the cartridge of a recording apparatus, alignment of the head opening of ejection and ink output port 53 is carried out for a cartridge to

the ink supply needle 14 from a package bag, and a cartridge is stuffed into the ink supply needle 14 at parallel. In this process, the ink supply needle 14 penetrates a seal 60, passes the seal inhibition material 58, and reaches a packing material 57. The through-hole 36 of the ink supply needle 14 and 36 are open for free passage with the ink feed hopper 15 by this, and the perimeter of the ink supply needle 14 has a fluid-tight condition held by the packing material 57. By the way, although a part of sealant 60 may invade in a feed hopper with the supply needle 14 in case the ink supply needle 14 penetrates a sealant 60, fragment 60a of a sealant 60 has migration in the upper part obstructed by the inhibition material 58 (drawing 10 I, RO), and does not reach a packing material 57. Consequently, even if space 66 is generated between the inhibition material 58 and the ink supply needle 14, fluid-tight nature is secured from this with the packing material 57 located in an ink side, and leakage of ink is prevented.

[0027] Drawing 11 shows the 3rd example of this invention, it is the base of a container in which a porous body for ink absorption which was mentioned above is held, and the pipe-like ink feed hopper 71 is formed here the same with having mentioned above, and the sign 70 in drawing is ****(ed) by opening of an upper bed through the filter 72 at the porous body for the above-mentioned ink absorption. A packing material 73 and the sealant inhibition member 74 are inserted in the center section of the ink feed hopper 71, a bush 75 is fixed, and opening 76 is closed by the sealant 77. 78 is the porous body prepared between the electrodes 80 for ink near end detection and sealants 73 which were prepared in the ink ** room 79, and it is positioned so that it may be stopped with a level difference 81 and may not move by insertion of an ink supply needle in the upper part, either. In addition, the sign 95 in drawing shows the electrode of another side for ink detection.

[0028] The almost horizontal openings 94, 94, and 94 are formed so that drawing 12 may show one example of the ink supply needle 90 suitable for the ink cartridge mentioned above, and may be equipped with the point 91 of the shape of the shape of a cone which closes insertion to a sealant 77, the inhibition material 74, and a packing material 73 if, and a slant face and it may be open for free passage to the internal feed hopper 93 at the body section 92.

[0029] If the sealant 77 of a cartridge is positioned to the ink supply needle 90 in this example and a cartridge is pushed in, the ink supply needle 90 will penetrate a sealant 77, and will pass the sealant inhibition member 74 and a packing material 73. since the point 91 is closed, the ink supply needle 90 has it prevented for it to be thought as a point 91 with a packing material 73, and to get across to a through-hole 93 (drawing 13 I), and escapes from the volume change of the ink reservoir room 79 produced according to the piston effectiveness produced in a cartridge insertion process in the upper part via the porous body 78 of an ink feed hopper -- things -- ** Thus, when the openings 94 and 94 of the ink supply needle 90 and 94 pass a packing material 73, missing the pressure of the ink feed hopper in a cartridge insertion process to a container side, ink is made to flow into a through-hole 93 through openings 94, 94, and 94 (this drawing RO).

[0030] Thus, in an ink cartridge insertion process, since a free passage with the through-hole 93 of an ink supply needle and the ink feed hopper 71 is severed, it can happen at the time of cartridge insertion, the volume change by the piston effectiveness to a recording head [win] can be prevented, the ink from the nozzle orifice of a recording head 4 can ooze, and ** can be prevented. Moreover, since it is not necessary to drill a through-hole in a point and sufficient reinforcement for an ink supply needle can be made to secure, it becomes possible to constitute a supply needle with ingredients other than a metal, for example, polymeric materials, and the simplification of a manufacture process and danger peculiar to a metal needle can be avoided.

Since suitable passage resistance is securable by choosing it as the through-holes 94 and 94 drilled even if it enlarges the outer diameter of an ink supply needle, and extent of 94 which can hold MENISUKA for a bore, even if it fabricates an ink supply needle by polymeric materials, it becomes possible to secure the reinforcement which is equal to cartridge insertion. [0031] By the way, when a cartridge is removed from an ink supply needle in spite of the condition that ink remains on account of a maintenance etc., the ink which exists near the ink supply needle head is absorbed to the porous body 78 located in the near according to the capillary tube force of the porous body for ink absorption in a cartridge. And since this porous body 78 has the capillary tube force almost equivalent to the porous body for ink absorption held in the cartridge body, ink will remain in the ink ** room 79. For this reason, even if it can prevent trespass of the air bubbles by the desorption of a cartridge and carries out desorption of the cartridge, when the output of an ink near end signal can be avoided and an ink near end signal will be outputted as a result, even if return actuation is a troublesome ink jet recording device, printing can be resumed only by re-equipping.

[0032] In addition, although the case where the ink supply needle with which the through-hole was horizontally drilled in the 3rd example was used was explained, when the piston effectiveness at the time of cartridge insertion is small, it is clear that the ink supply needle which has a through-hole at a head as shown in drawing 3 is usable. Moreover, stop material is used so that the 3rd example may set and it may prevent omission of a packing material and a sealant inhibition member, but omitting is possible when the rigidity of a sealant is comparatively large.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the sectional view showing one example of this invention where a recording device is equipped.

[Drawing 2] It is the block diagram showing the outline of an ink jet recording device in which the ink cartridge of this invention is used.

[Drawing 3] It is drawing in which it is expanded and shown near the ink supply needle in drawing 1 .

[Drawing 4] It is the block diagram showing an example of an ink near end detector.

[Drawing 5] It is the perspective view showing one example of the package gestalt of an ink cartridge.

[Drawing 6] It is the diagram showing the relation between a retention period and the Chisso solubility to ink.

[Drawing 7] It is the sectional view showing other examples of the package gestalt of an ink cartridge.

[Drawing 8] It is the sectional view showing the structure near the seal plate of an ink cartridge.

[Drawing 9] It is the sectional view showing other examples of the ink cartridge of this invention.

[Drawing 10] These drawing (b) (b)s are drawing of longitudinal section showing actuation of the ink supply needle insertion process in the ink cartridge shown in drawing 9 , respectively, and a cross-sectional view.

[Drawing 11] It is the sectional view it is indicated that is also at the structure near the ink feed hopper about other examples of this invention.

[Drawing 12] It is drawing showing one example of the ink supply needle suitable for the ink cartridge shown in drawing 12 .

[Drawing 13] Drawing (b) (b) is the explanatory view showing actuation with the ink cartridge and ink supply needle which were shown in drawing 12 and drawing 13 , respectively.

[Description of Notations]

1 Carriage

3 Platen

4 Ink Jet Type Recording Head

5 Ink Cartridge

6 Cap Equipment

11 Container

12 Opening

13 Base

14 Ink Supply Needle

15 Ink Output Port

19 Packing Material

20 Sealant

21 Porous Body